

CLAIMS

1/ A drill string fitted with information transmission means, the string comprising:

5 a plurality of hollow rods made of conductive material, the inside faces of said rods being covered in insulating material;

10 a drilling tool secured to the bottom rod of the drill string, said drill string being disposed in part in a borehole filled with an electrically conductive mud, said mud inside the drill string and the conductive mud outside the drill string together with the drill string itself forming an electrically conductive loop;

15 a first electrical unit disposed close to the bottom end of the drill string having at least a first annular electrode secured to the insulating inside face of the drill string, said electrode being electrically in contact with the mud contained inside the drill string, in order at least to create an electrical current in said loop that is representative of information to be
20 transmitted;

a second electrical unit disposed in said borehole, close to the top end of the drill string, in order at least to receive the information contained in said electrical current; and

25 means for applying a voltage to said electrode, which voltage is representative of the information to be transmitted.

30 2/ A drill string according to claim 1, in which said second electrical unit is constituted by second and third annular electrodes fixed to the insulating inside wall of the drill string and in electrical contact with the mud contained in said drill string, said second and third electrodes being axially offset, and accompanied by means
35 for picking up the potential difference created between said second and third electrodes.

3/ A drill string according to claim 1, in which said second electrical unit is constituted by an electromagnetic coupling coil mounted inside said drill string and surrounding the mud inside the drill string, and by means for picking up the electrical voltage developed across the terminals of said coil by the flow of said electrical current.

4/ A drill string according to claim 2, for transmitting information in both directions between said first and second electrical units, in which said first electrical unit further comprises a fourth annular electrode secured to the insulating inside wall of the drill string and in electrical contact with the mud contained in said drill string, being axially offset relative to the first electrode, and means for picking up the voltage which appears between said first and fourth electrodes in response to the electrical current flowing in said current loop as created by said second electrical unit.

5/ A drill string according to claim 2, for transmitting information in both directions between said first and second electrical units, in which said first electrical unit further comprises a fourth electrode secured to the insulating inside wall of the drill string and in electrical contact with the mud contained in said drill string, being axially offset from the first electrode, and means for picking up the voltage which appears between said first and fourth electrodes in response to an electrical current flowing in said current loop as created by said second electrical unit, and in which said second electrical unit comprises means for applying to said second electrode a voltage that is representative of information for transmission from said second electrical unit to the first electrical unit.

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6/ A drill string according to claim 1, in which each annular electrode is disposed in the insulating material in such a manner that the inside face of each electrode is flush with the inside face of the insulating material.

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7/ A drill string according to claim 1, in which each electrode has an inside face that withstands abrasion.

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